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COSMIC RAY EQUATOR ACCORDING TO DATA OF THE SECOND SOVIET SPACESHIP

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COSMIC RAY EQUATOR

ACCORDING TO DATA OF THE SECOND SOVIET SPACESHIP.

(Ekvator kosmicheskikh luchey

po dannym 2-go sovetskogo kosmicheskogo korablya)

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Artificial Earth Satellites (AES)
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The determination of the geographic position of the minimum intensity line of primary cosmic radiation (cosmic ray equator) allows the study of geomagnetic field structure, and to check the validity of that field's theoretical and empirical approximations.

The utilization of satellites for the determination of cosmic ray equator presents a series of advantages in comparison with terrestrial investigations: 1) a greater number of equator crossings at various points during a relatively short time interval; 2) a direct registration of the primary component of cosmic radiation.

This provides the possibility to investigate in detail the cosmic ray equator at various moments of time, and in particular, to study the effect on its position of various geophysical phenomena.

At the same time, the necessity of introducing barometric and temperature corrections drops off, just as do the corrections for time variations.

Among the apparatus of the second spaceship, designed to register ionizing radiations, there was a gas-discharge counter. From that counter pulses entered the scaling circuit interrogated every 3 minutes by a 24-hour autonomous memory device. This information was then reproduced and transmitted to the Earth with the aid of a ground-controlled radio telemetric apparatus. The availability of a 24-hour memory allowed to measure the latitude dependence of the primary cosmic radiation at each crossing of the equator. Inasmuch as the spaceship partially flew through radiation belts at higher latitudes, only experimental points for latitudes below 40^{o} were utilized during the construction of the empirical formula by the method of least squares, and a second order parabola served as an approximating function.

The position of cosmic ray intensity minima was thus determined for 22 latitude curves obtained at various crossings of the geographic equator region (Fig. 1).

The obtained cosmic ray equator is incompatible with the representation of the geomagnetic field in the form of a dipole [1 – 6]. The comparison of the cosmic ray equator with that calculated by Quenby and Webber [7], accounting for the dipole as well as the nondipole parts of the geomagnetic field, and also with the equator computed by Kellogg and Schwartz in the octuple approximation [8], gives a sufficient agreement within the limits of experimental precision. A more detailed comparison is possible by reducing the measurement error.

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***** E N D *****

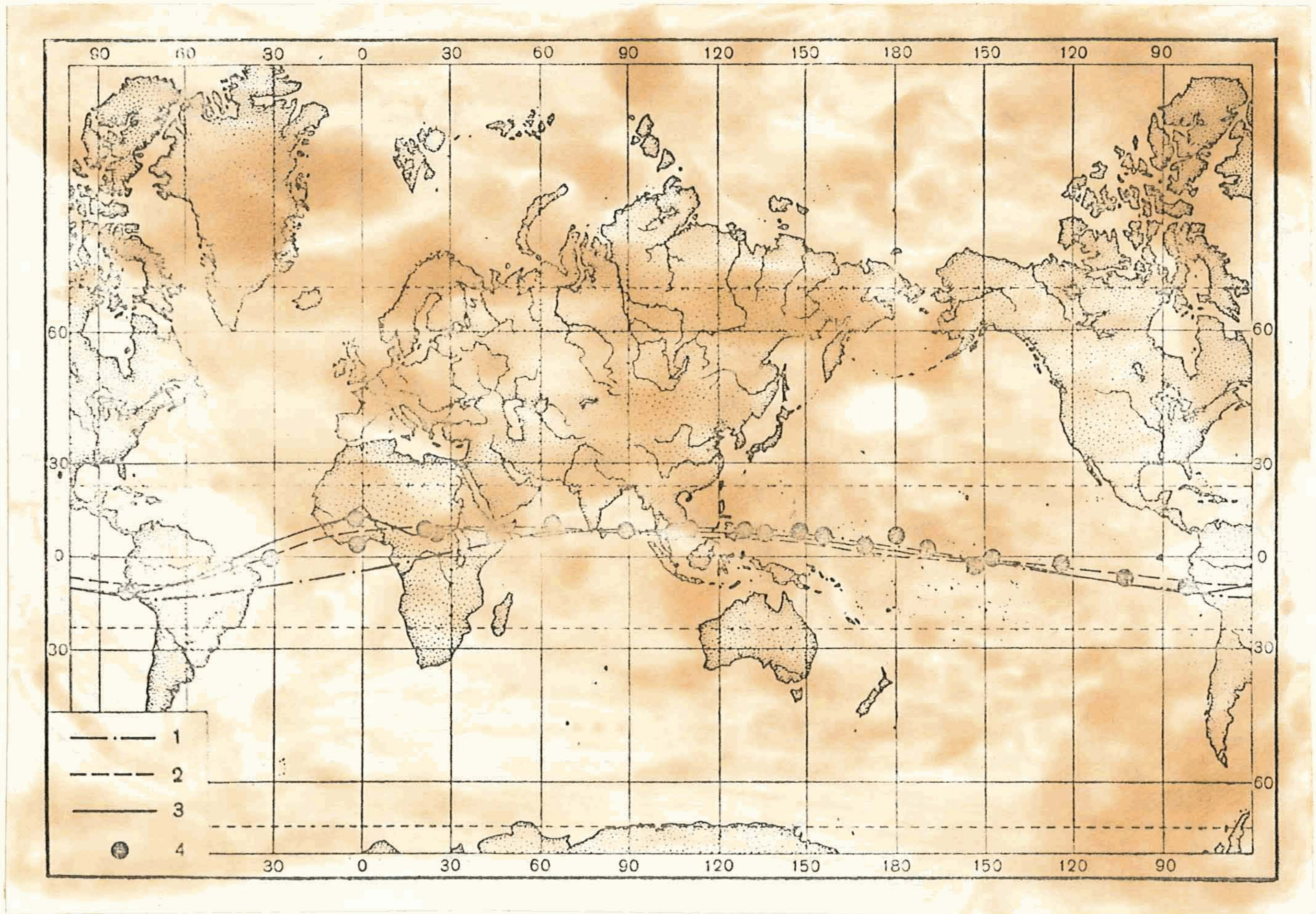

Fig. 1. COSMIC RAY EQUATOR :

1 — geomagnetic equator of the dipole field; 2 — equatot computed with the dipole and nondipole parts of the geomagnetic field; 3 — equator computed in octuple approximation; 4 — data obtained on the 2nd Soviet spaceship.

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